

Nationally Available Tools and Projects for Groundwater Science

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Groundwater Protection: Science, Planning and Action

May 6, 2011

Networks

Types of Networks:

- Surface Water
- Groundwater
- Climate
- Water-quality

Networks include other:

- Federal
- State
- Regional
- Local

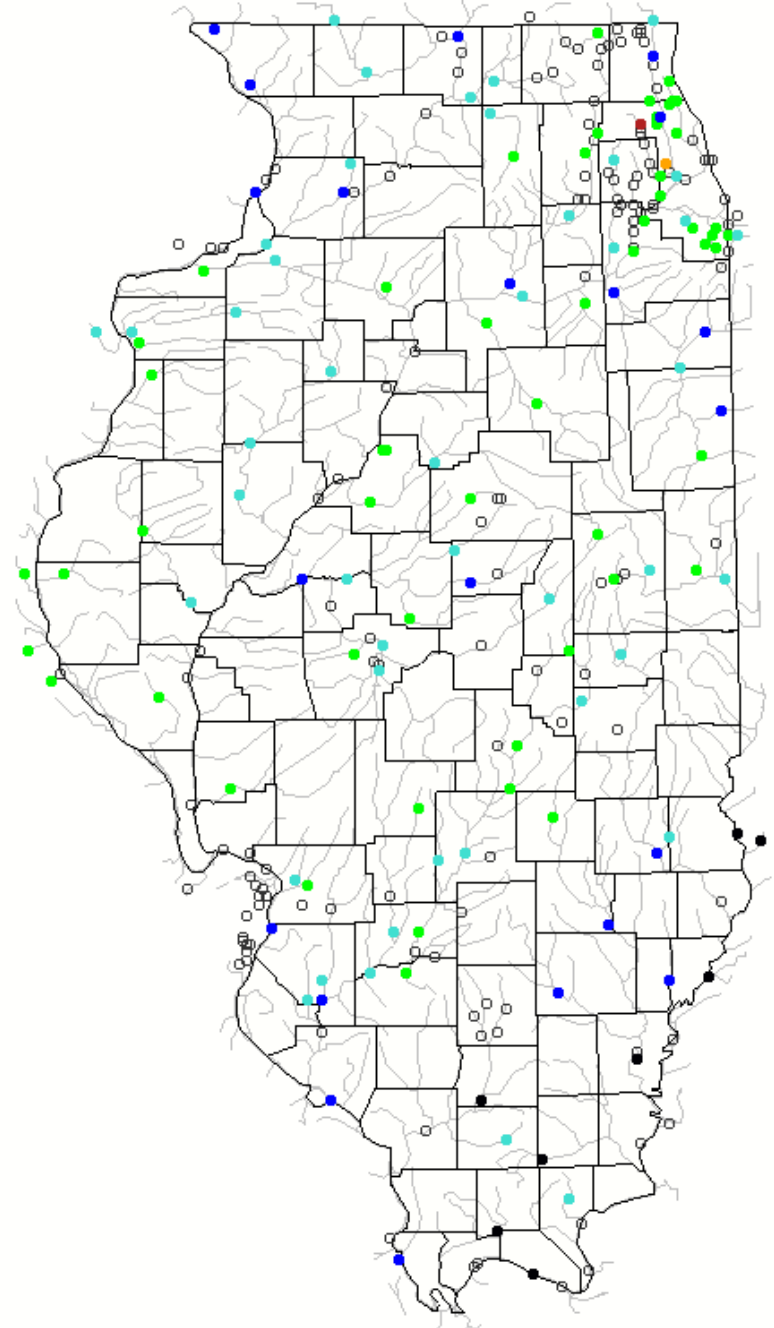
Other Federal Agencies

- US Environmental Protection Agency
- US Army Corps of Engineers
- Nuclear Regulatory Commission
- Department of Energy
- Department of Agriculture (NRCS, USFS, etc.)
- Others...








Surface Water Gages

- ~220 stream gages
- Almost all present data near real time

Thursday, May 05, 2011 11:30ET



Explanation - Percentile classes

							
Low	<10	10-24	25-75	76-90	>90	High	Not-ranked
	Much below normal	Below normal	Normal	Above normal	Much above normal		

GroundWater Wells

- Generally not real time
- Wells have infrequent measurements



Explanation - Percentile classes (symbol color based on most recent measurement)

●	●	●	●	●	●	●	●	○ Real Time
Low	<10	10-24	25-75	76-90	>90	High	Not Ranked	□ Continuous
	Much Below Normal	Below Normal	Normal	Above Normal	Much Above Normal			△ Periodic Measurements

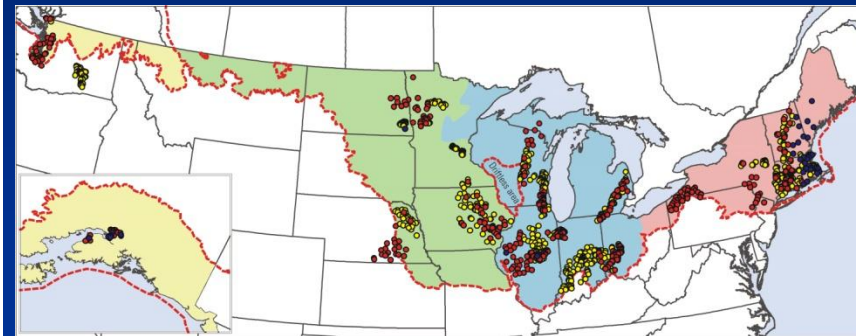
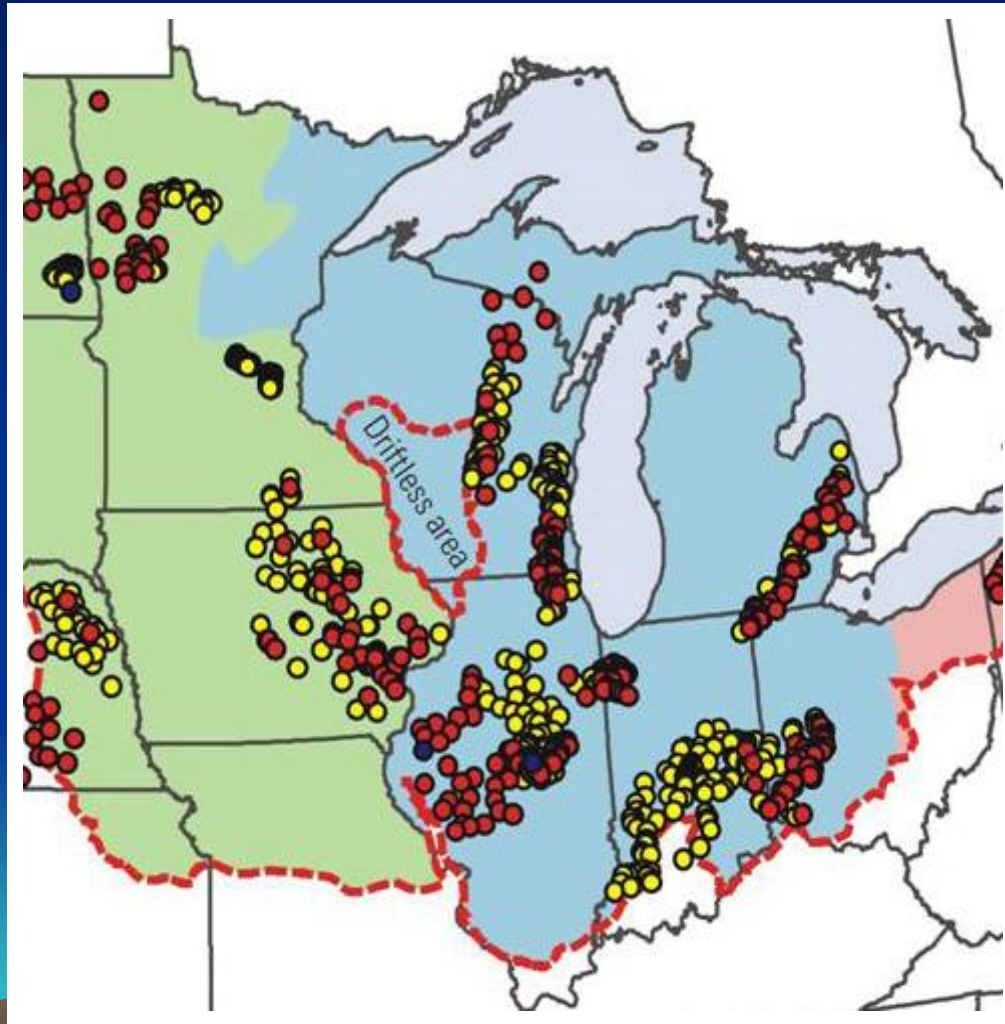
Water Quality

- Real Time vs. Synoptic Measurements
- Regular Intervals vs. Irregular Sampling
- Project vs. Network Scales
- Laboratory vs. Instrumentation

Glacial and Cambrian-Ordovician Aquifer Systems



NAWQA data collected in Glacial Aquifer System



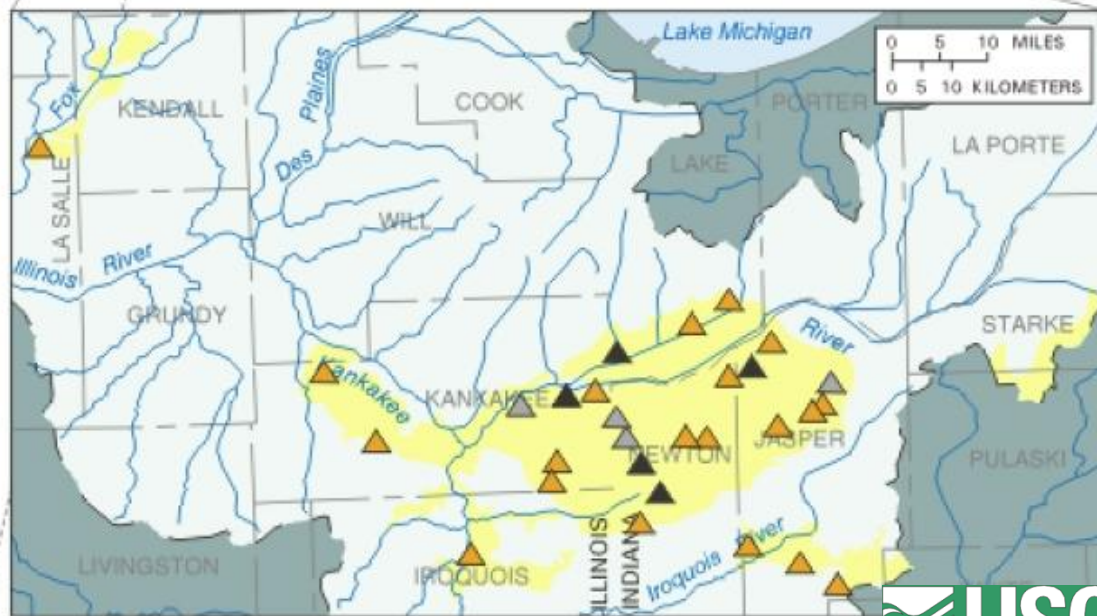
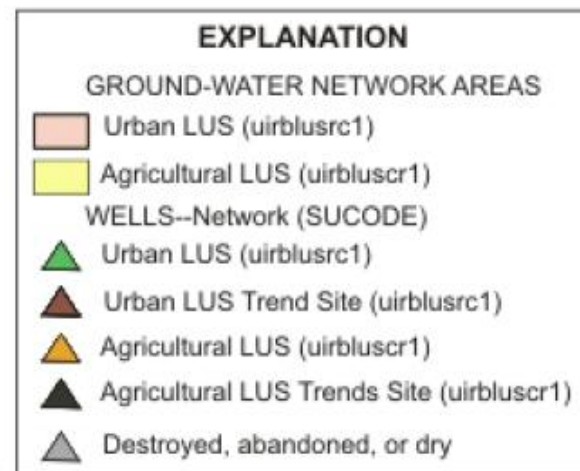
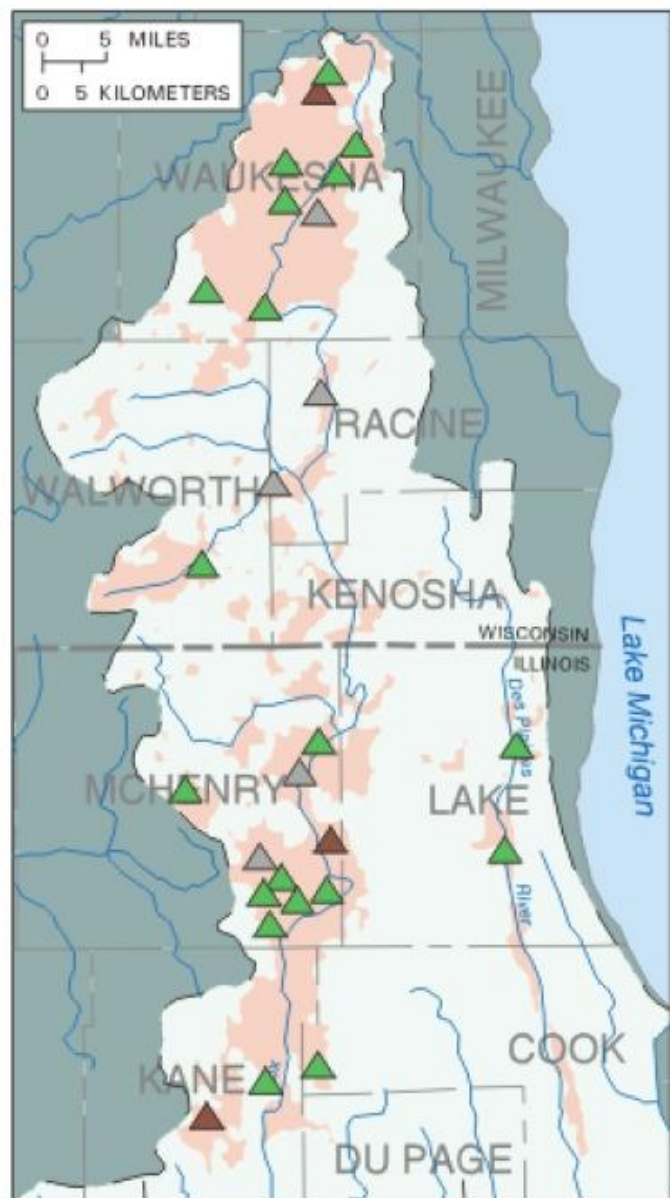
Glacial framework area

- East
- Central
- West-central
- West

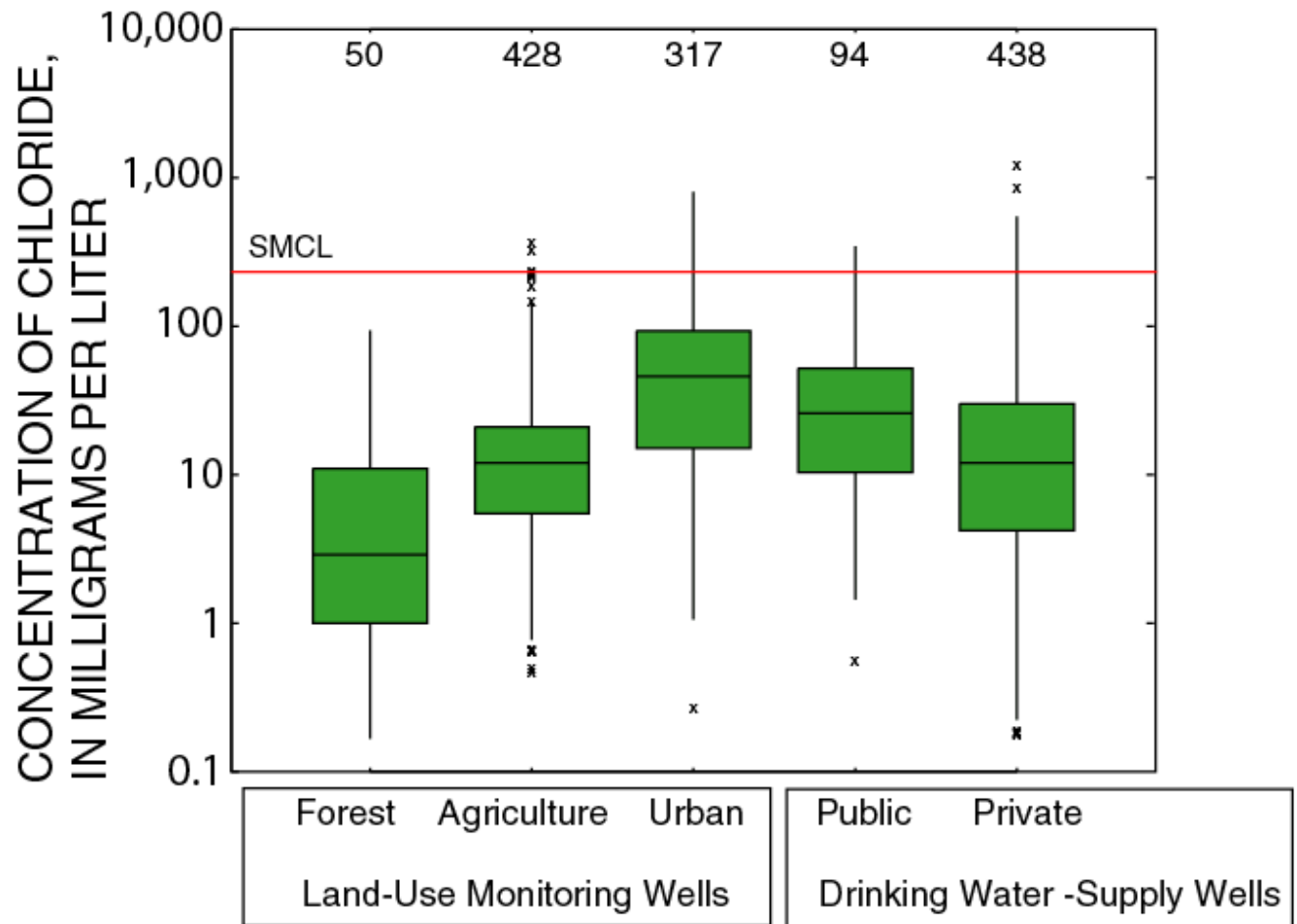
Well Type

- Private (471)
- Public (99)
- Monitoring (1116)

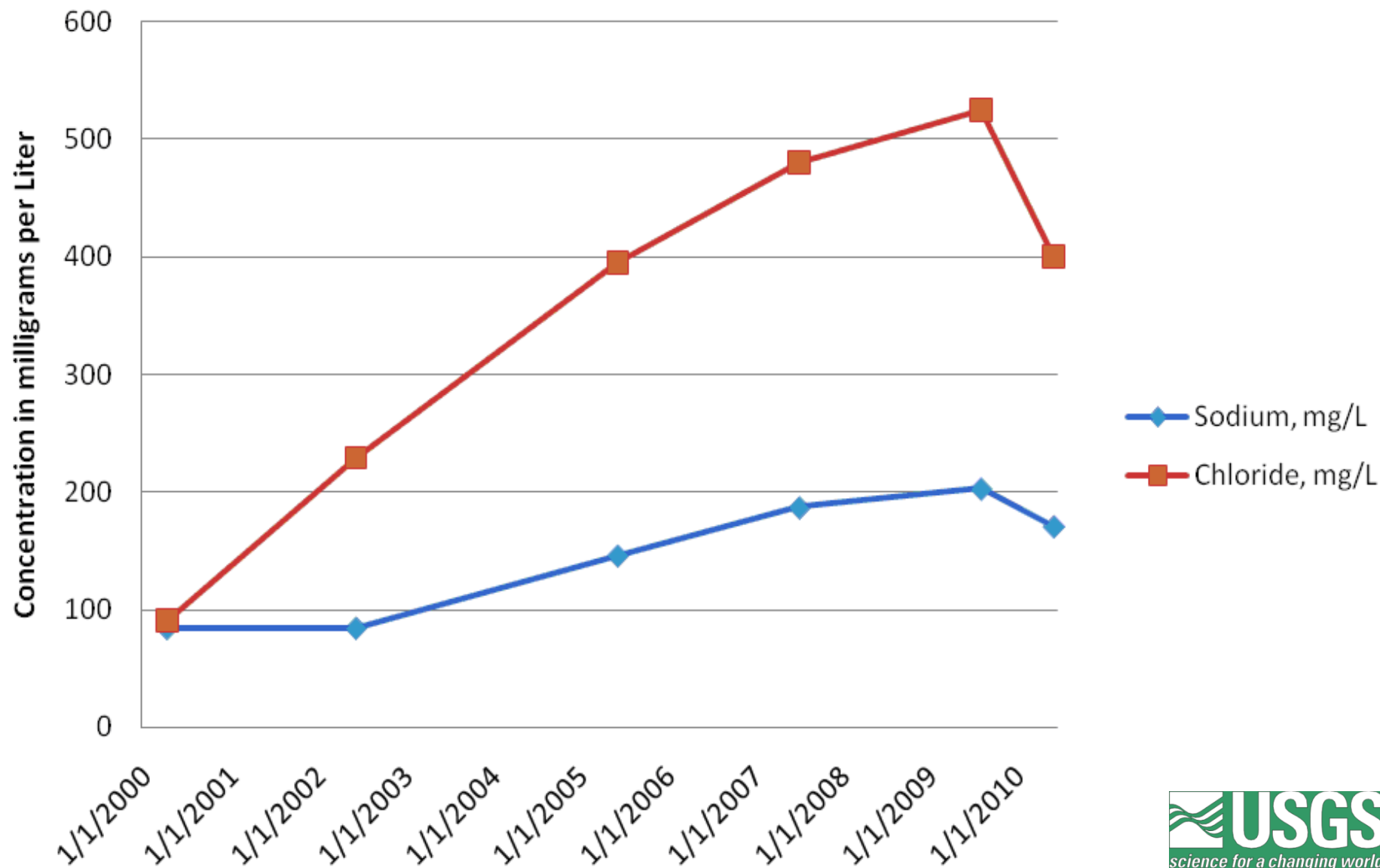
NAWQA Land-Use Groundwater Networks



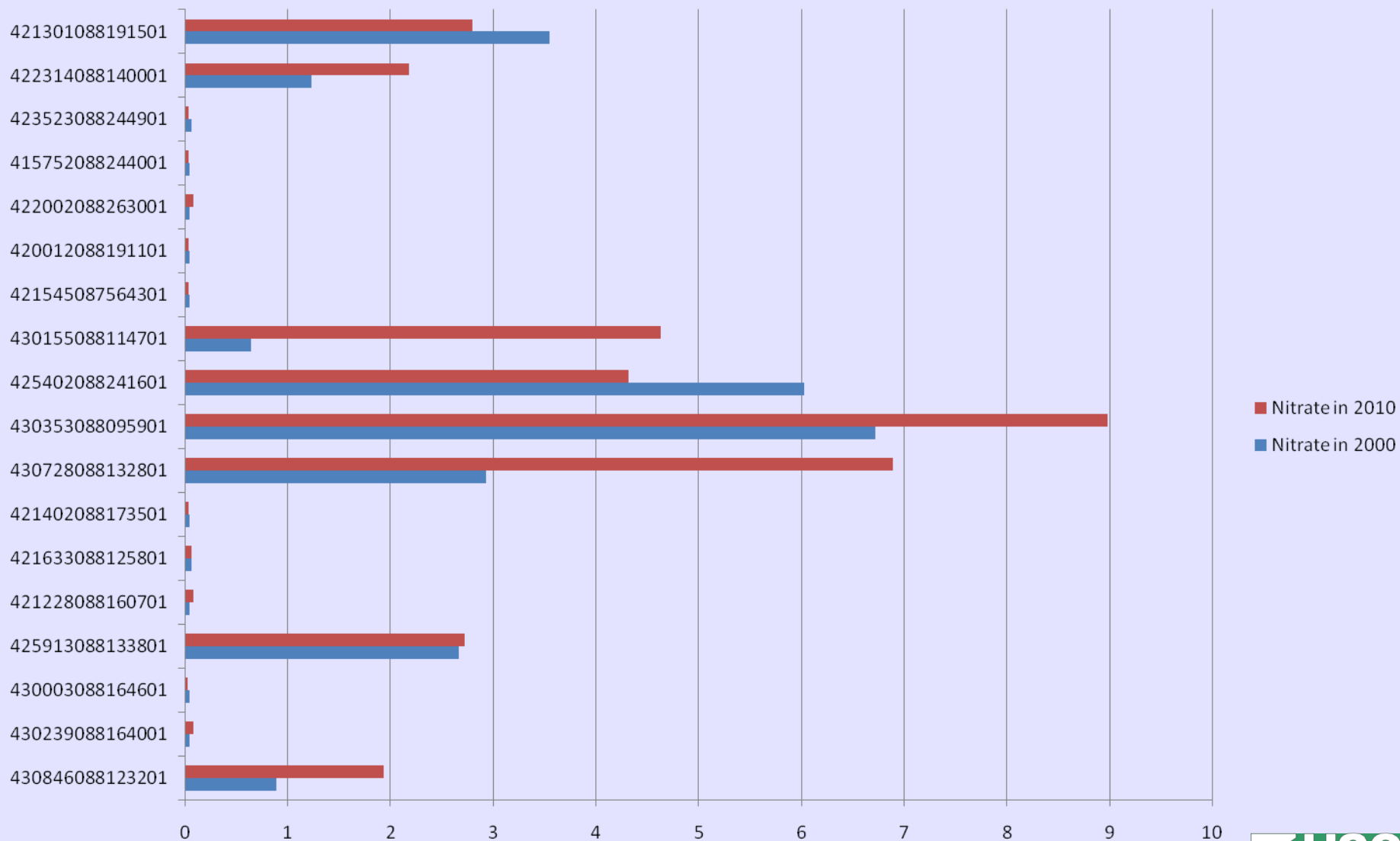
Chloride in groundwater is highest in urban areas



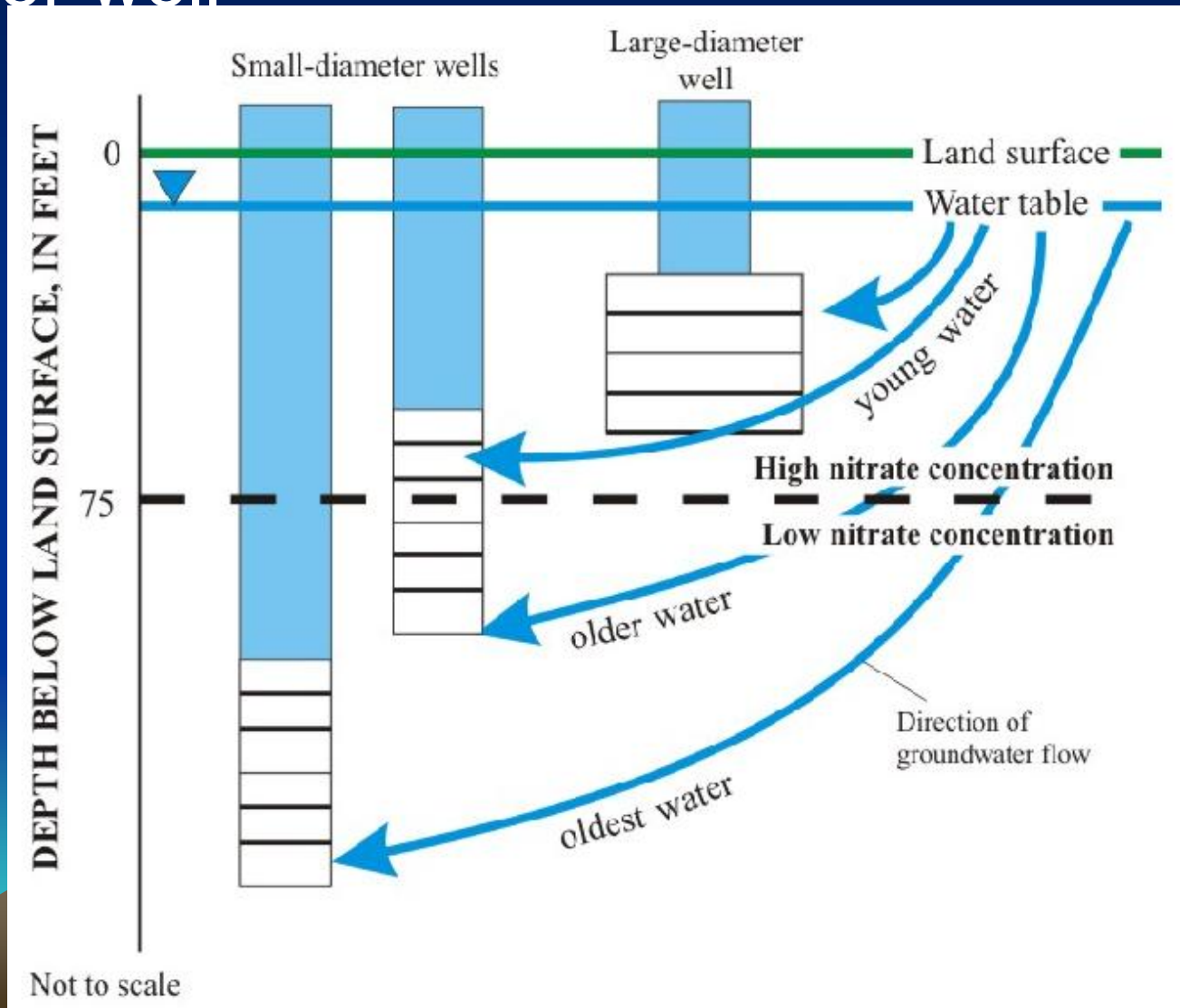
Chloride and Sodium Concentrations in McHenry County NAWQA Well from Years 2000-2010



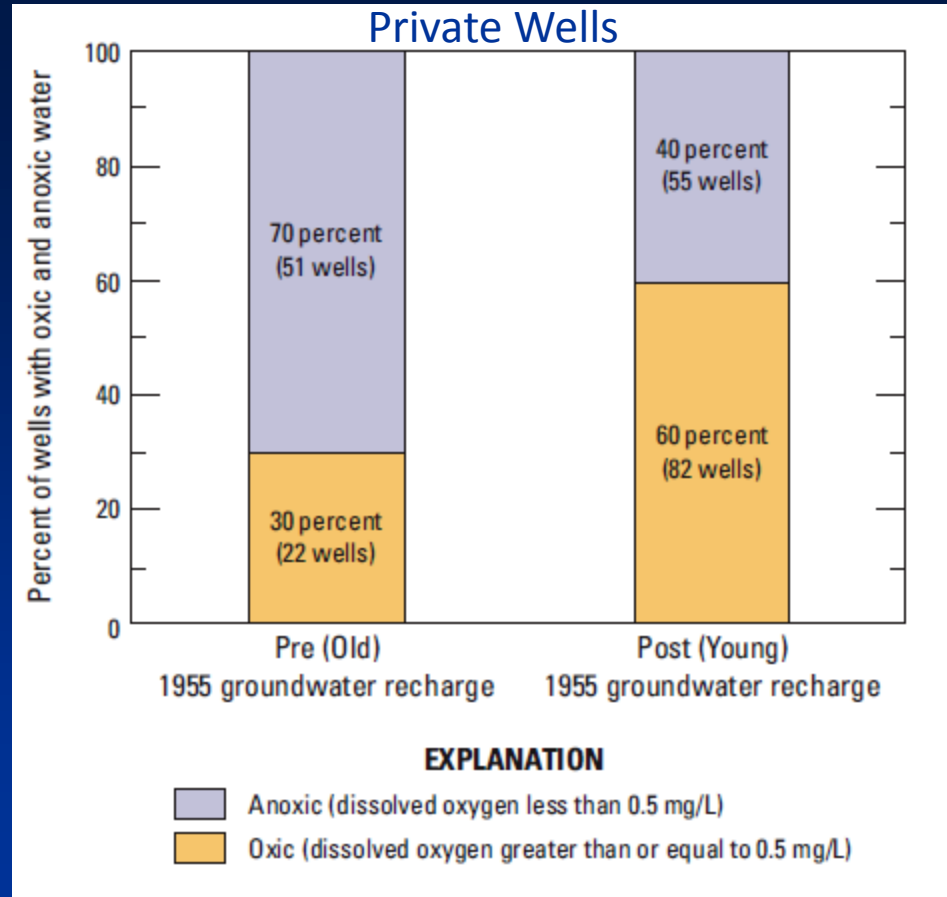
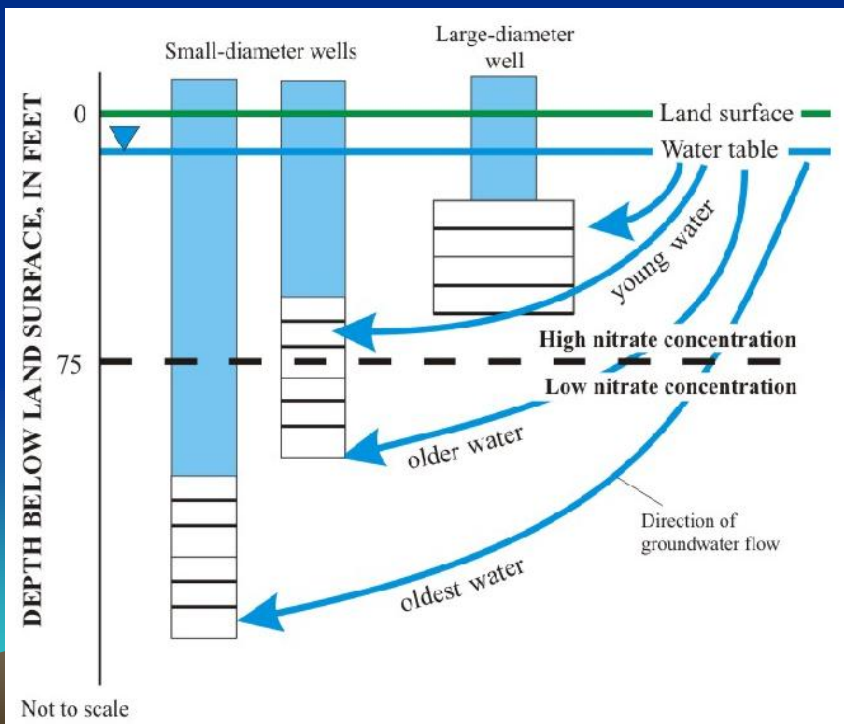
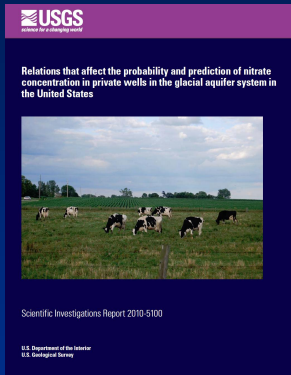
Example of Nitrate Trends



A large diameter private well is more likely to have elevated nitrate concentrations than a smaller diameter well

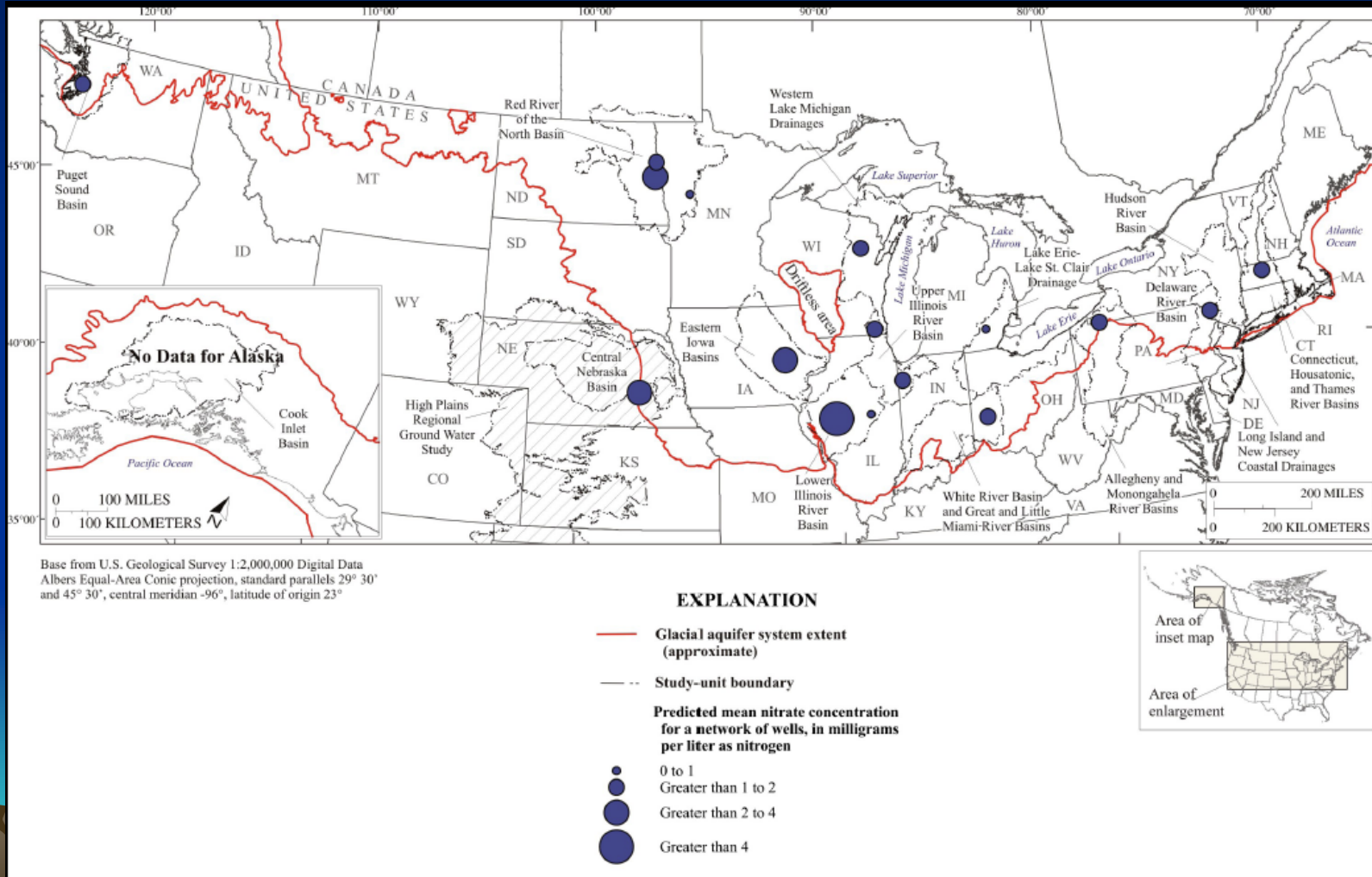


Long residence times and the absence of oxygen are prevalent in deep drinking-water wells which decreases the likelihood of nitrate detection.

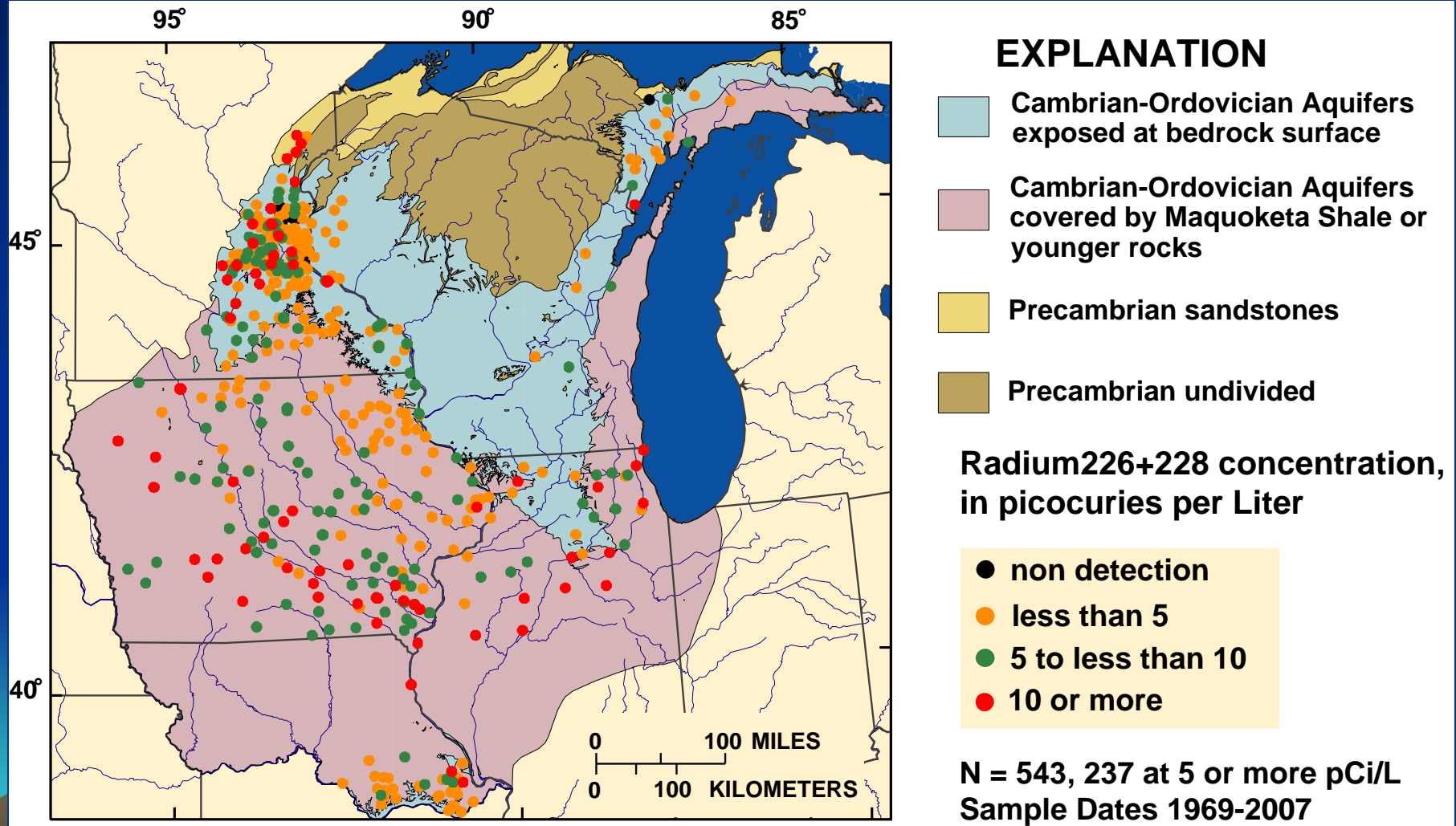


Well type	Mean Depth	Mean N
Monitoring	28.7	4.7
Public	91.0	0.69
Domestic	96.2	2.00

Nitrate concentration is predicted by networks of wells. The highest predicted mean nitrate concentration in private wells is in west-central Illinois.



Cambrian-Ordovician Combined Radium Concentrations



Many Reports

- Project Areas
(older reports)
- Geologic
Settings
- Trends Reports
(coming soon)

Relations that affect the probability and prediction of nitrate concentration in private wells in the glacial aquifer system in the United States

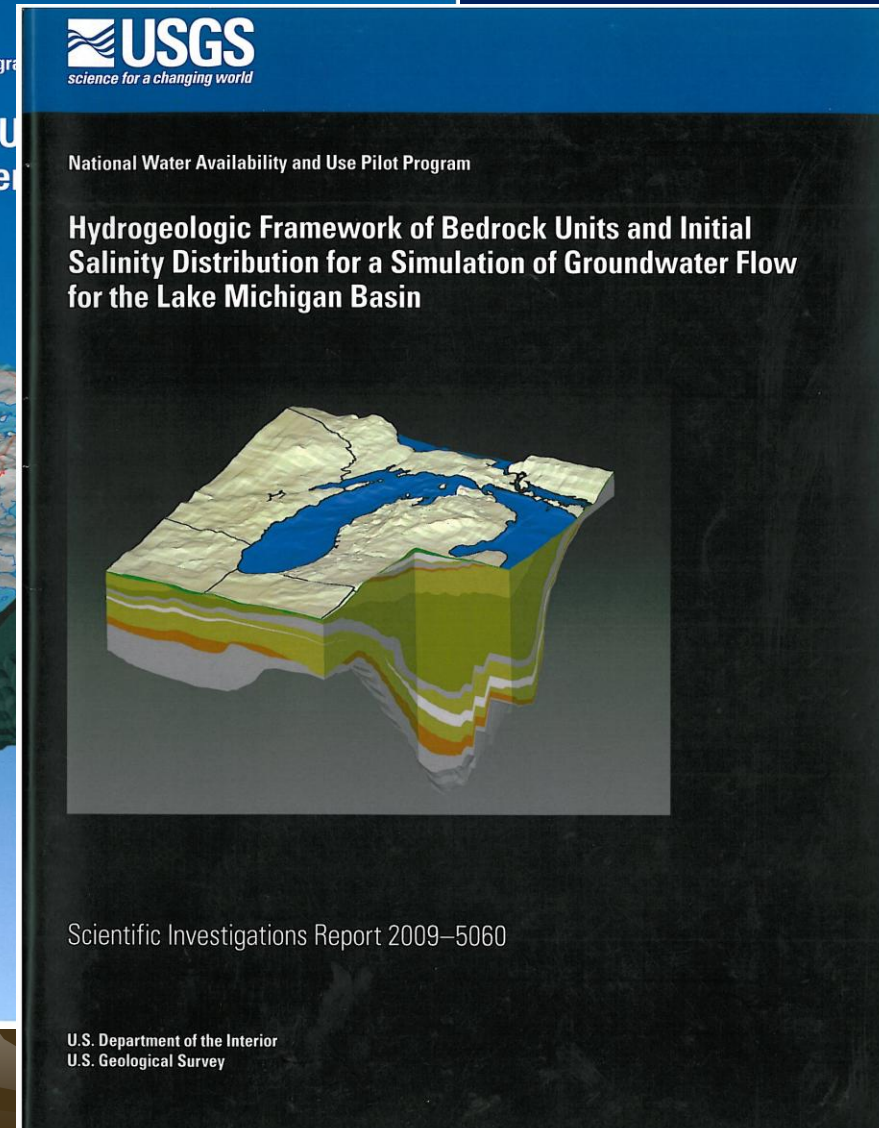
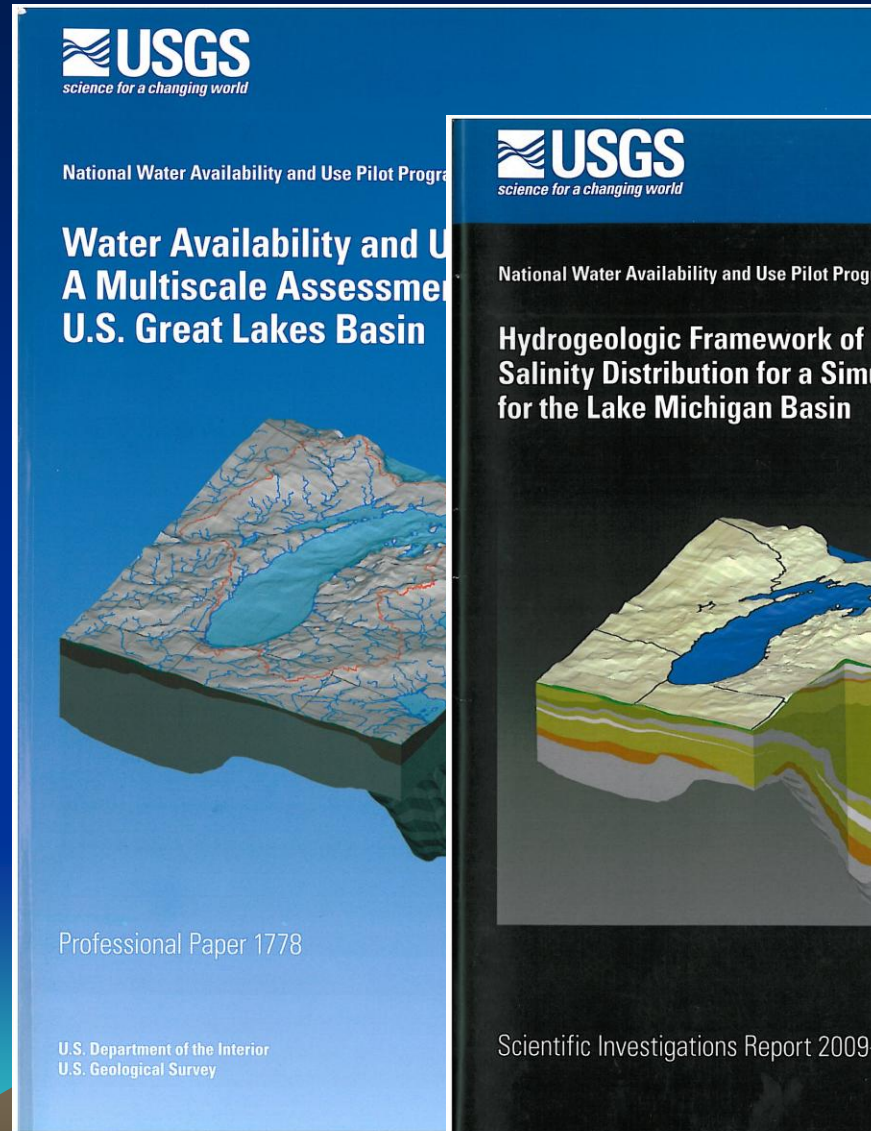


Scientific Investigations Report 2010-5100

U.S. Department of the Interior
U.S. Geological Survey

Other USGS studies

Great Lakes Pilot on Water Availability and Use

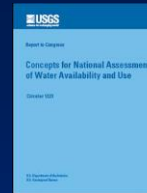


Future Work

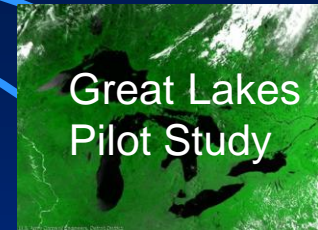
- WaterSMART
- Groundwater Resource Projects
- Sediment Pilot

??? Budget Issues ???

2002



2005

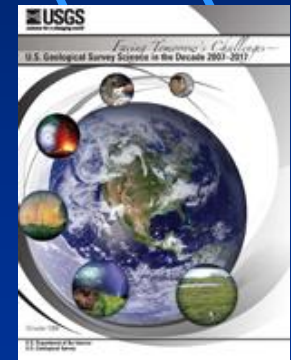


2011

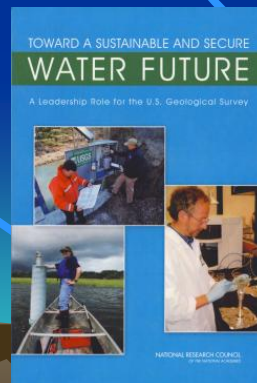


Water Availability and Use Assessment

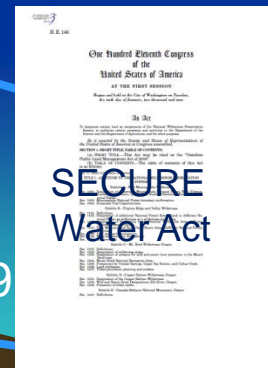
2007



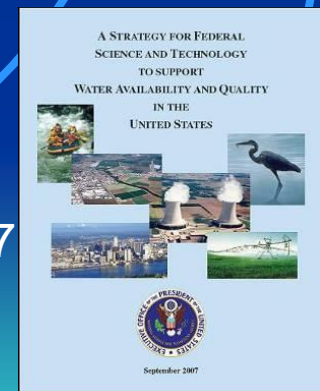
2009



2009



2007

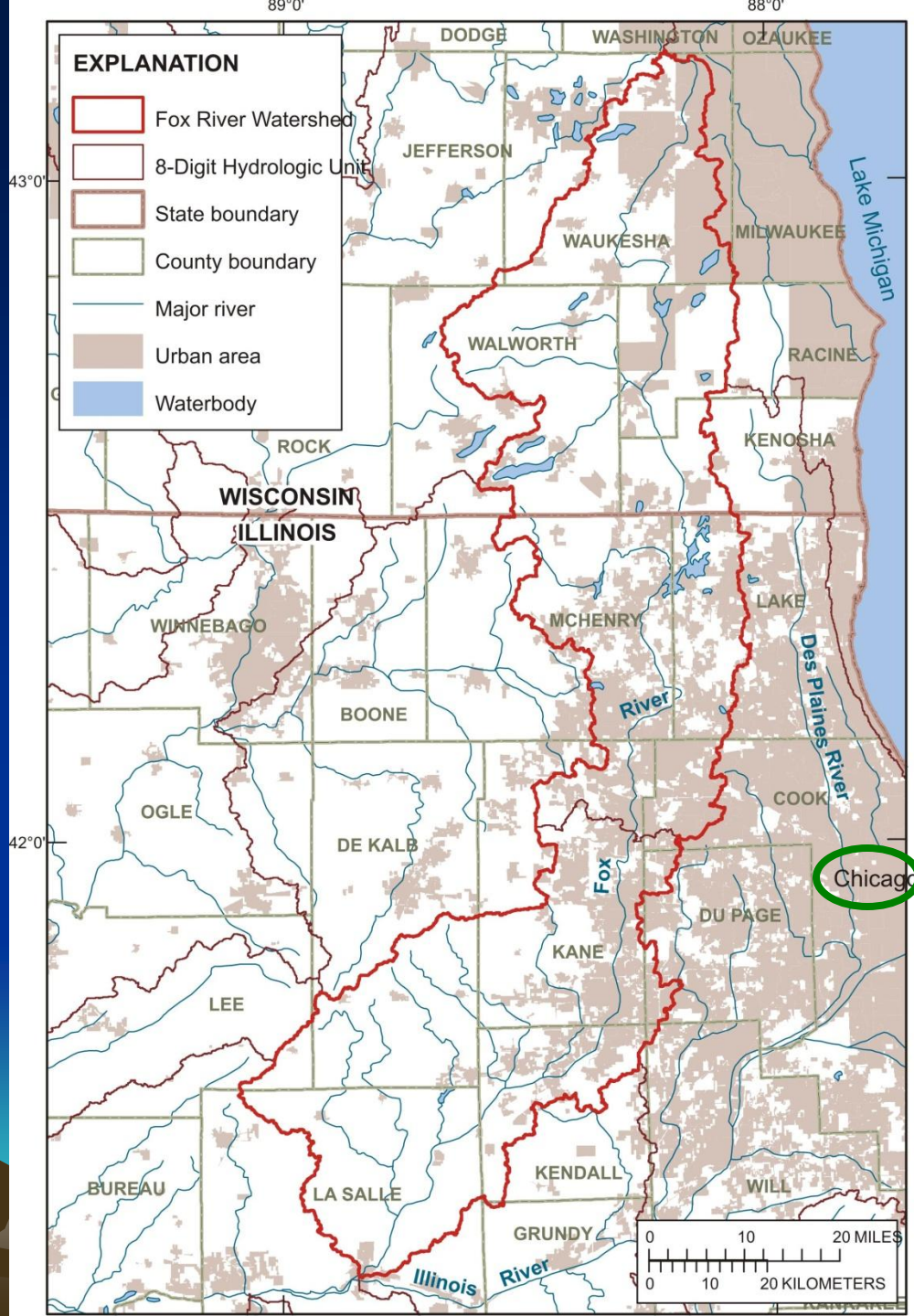


WaterSMART Components

- Hydrologic Networks and Analysis
- Groundwater Resources Program
- Biological Research and Monitoring
- Geographical Analysis and Monitoring
- National Cooperative Geologic Mapping

McHenry County, Illinois and the Fox River Watershed in Illinois and Wisconsin

- Heavy Use of Shallow Groundwater for Water Supply
- Confined Aquifers limited
- Lake Michigan Water Not Available
- Increasing Urbanization in County
- Conflicts between Consumptive Water Use, Water Quality Stressors, and Ecological Uses



Note:

- All USGS data is available through the web (National Water Information System (NWIS))

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Questions?